

Customer No.: 31561  
Docket No.: 12119-US-PA  
Application No.: 10/710,421

### REMARKS

#### Present Status of the Application

The Office Action rejected all presently-pending claims 1-8, 10-22 and 24-28. Specifically, the Office Action rejected claim 8 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. The Office Action rejected claims 1-3 and 10-12 under 35 U.S.C. 102(b) as being anticipated by Sheu et al. (US 2002/0179914). The Office Action rejected claims 4-8 under 35 U.S.C. 103(a) as being unpatentable over Fig. 2B of Sheu in view of Fig. 3B of Sheu. The Office Action rejected claims 13-14 under 35 U.S.C. 103(a) as being unpatentable over Sheu in view of Yonezawa et al. (U.S. 2004/0157432). The Office Action rejected claims 15-22 and 24-26 under 35 U.S.C. 103(a) as being unpatentable over Sheu et al. in view of Ikeda (U.S. 6,900,698). The Office Action rejected claims 27-28 under 35 U.S.C. 103(a) as being unpatentable over Sheu and Ikeda and further in view of Yonezawa.

Applicants have amended claims 1, 7-8, 10-12, 15, 21-22 and 24-26 to more clearly define the present invention. After entry of the foregoing amendments, claims 1-8, 10-22 and 24-28 remain pending in the present application, and reconsideration of those claims is respectfully requested.

#### Rejection under 35 U.S.C 112, second paragraph

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Applicants respectfully traverse the rejection of claim 8 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention because the dependency of claim 8 is amended to "claim 6".

In addition, the dependency of claim 9 is also amended to "claim 6", and the dependency of claims 21 and 22 is amended to "claim 20".

**Rejection under 35 U.S.C 102 (b)**

*Applicants respectfully traverse the 102(b) rejection of claims 1-3 and 10-12 because Sheu (U.S. 2002/0179914) does not teach every element recited in these claims.*

In order to properly anticipate Applicants' claimed invention under 35 U.S.C 102, each and every element of claim in issue must be found, "either expressly or inherently described, in a single prior art reference". "The identical invention must be shown in as complete details as is contained in the .... claim. Richardson v. Suzuki Motor Co., 868 F. 2d 1226, 1236, 9 USPQ2d 1913, 1920 (Fed. Cir. 1989)." See M.P.E.P. 2131, 8<sup>th</sup> ed., 2001.

The present invention is in general related to a flip chip light-emitting diode package as claim 1 recites:

1. A flip chip light-emitting diode package, comprising:
  - a Schottky diode comprising:
    - a first conductive type submount having a first surface and a second surface;  
*a first ohmic contact layer, disposed on a portion of the first surface of the first conductive type submount;*
    - a second ohmic contact layer, disposed on the second surface of the first conductive type submount;* and

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*a Schottky contact layer, disposed on another portion of the first surface of the first conductive type submount and directly connected with the first conductive type submount,* wherein the ohmic contact layer and the Schottky contact layer are electrically isolated; and  
a light-emitting diode, disposed on the Schottky diode by flip-chip bonding process, wherein the light-emitting diode and the Schottky diode are connected reverse and in parallel.

Sheu fails to disclose, teach or suggest the feature of that *the first and second ohmic contact layers* are respectively disposed on the first and second surfaces of *the first conductive type submount* and *the Schottky contact layer* directly connects with *the first conductive type submount*. In Fig. 2B of Sheu, the diode 40 includes an n-doped silicon layer 42, a p-doped silicon layer 44 and a pair of metallic layers 46a, 46b. The electrodes 38a, 38b of the diode 30 respectively electrically contact with the metallic layers 46b, 46a of diode 40. In particular, the metallic layer 46a is disposed on the p-doped silicon layer 44 over the n-doped silicon layer 42. In other words, the metal layer 46a is connected with the p-doped silicon layer 44, and the metal layer 46b is connected with the n-doped silicon layer 42. Therefore, the two metal layers 46a and 46b are respectively connected to the two silicon layers having different conductive types.

However, in claim 1 of the present application, the Schottky contact layer directly connects with the first conductive type submount and the first and second ohmic contact layers are disposed on the first and second surface of the first conductive type submount respectively, such that all of the Schottky contact layer and the first and second ohmic contact layers are connected to the submount having the first conductive type (such as P or N type). Sheu fails to disclose, teach or suggest the feature as above mentioned, and thus Sheu does not teach every element recited in claim 1.

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For at least the foregoing reasons, Applicant respectfully submits that independent claim 1 patently defines over the prior art reference, and should be allowed. For at least the same reasons, dependent claims 2-3 and 10-12 patently define over the prior art as a matter of law, for at least the reason that these dependent claims contain all features of their respective independent claim.

**Rejection under 35 U.S.C 103 (a)**

*Applicants respectfully traverse the rejection of claims 4-8 under 103(a) as being unpatentable over Fig. 2B of Sheu in view of Fig. 3B of Sheu and the rejection of claims 13-14 as being unpatentable over Sheu in view of Yonezawa et al. (U.S. 2004/0157432) because a prima facie case of obviousness has not been established by the Office Action.*

To establish a prima facie case of obviousness under 35 U.S.C. 103(a), each of three requirements must be met. First, the reference or references, taken alone or combined, must teach or suggest each and every element in the claims. Second, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to combine the references in a manner resulting in the claimed invention. Third, a reasonable expectation of success must exist. Moreover, each of the three requirements must "be found in the prior art, and not be based on applicant's disclosure." See M.P.E.P. 2143, 8th ed., February 2003.

Applicants submit that, as disclosed above, Sheu fails to teach or suggest each and every element of claim 1 from which claims 4-8 and 13-14 depend.

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In Fig. 3B of Sheu, a LED having a Schottky barrier diode is disclosed. The LED includes a transparent substrate 100, a first nucleation layer 102a, a second nucleation layer 102b, a first conductive buffer layer 104a, a second conductive buffer layer 104b, a lower confinement layer 106, an active layer 108, an upper confinement layer 110, a contact layer 112, a transparent electrode 114, an electrode 116, a Schottky contact electrode 118 and an ohmic contact electrode 120. In particular, the diode comprising the ohmic contact electrode 120 and the Schottky contact electrode 118 and the diode comprising the transparent electrode 114 and the electrode 116 are formed on the substrate 100. However, the two diodes of the device shown in Fig. 2B are not formed on the substrate 132 but are bonded together through bumps 150a, 150b. Moreover, there is only one ohmic contact electrode 120 in the device of Fig. 3B. The two devices respectively shown in Fig. 2B and Fig. 3B are so much different, and there is not suggestion or motivation, in the reference or in the knowledge generally available to one of ordinary skilled in the art, to combine the two devices in a manner resulting in the claimed invention (See *Tec Air, Inc. v. Denso Mfg. Mich. Inc.*, 192 F.3d 1353, 1359-60 (Fed. Cir. 1999); *Pro-Mold & Tool Co. v. Great Lakes Plastics, Inc.*, 75 F.3d 1568, 1572 (Fed. Cir. 1996)). Therefore, independent claim 1 is patentable over Fig. 2B of Sheu and Fig. 3B of Sheu.

In addition, Yonezawa also fails to teach the first and second ohmic contact layers are respectively disposed on the first and second surfaces of the first conductive type submount and the Schottky contact layer directly connects with the first conductive type submount. Yonezawa cannot cure the deficiencies of Sheu. Therefore, independent claim 1 is patentable over Sheu and

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Yonezawa. For at the least the same reasons, its dependent claims 4-8, 13-14 are also be patentable.

*Applicants respectfully traverse the rejection of claims 15-22 and 23-26 under 103(a) as being unpatentable over Sheu in view of Ikeda (U.S. 6,900,698) because a prima facie case of obviousness has not been established by the Office Action.*

The present invention also provides another flip chip light-emitting diode package as claim 15 recites:

15. A flip chip light-emitting diode package, comprising:  
a Schottky diode group having a plurality of Schottky diodes, wherein the Schottky diodes are electrically connected in series, in parallel or in series and parallel together, each of the Schottky diodes comprises:  
a first conductive type submount having a first surface and a second surface;  
*a first ohmic contact layer, disposed on a portion of the first surface of the first conductive type submount;*  
a second ohmic contact layer, disposed on the second surface of the first conductive type submount; and  
*a Schottky contact layer, disposed on another portion of the first surface of the first conductive type submount and directly connected with the first conductive type submount,* wherein the ohmic contact layer and the Schottky contact layer are electrically isolated; and  
a light-emitting diode disposed on one of the Schottky diodes by flip-chip bonding process, wherein the light-emitting diode and the Schottky diode group are connected reverse and in parallel.

As discussed above, Fig. 2B of Sheu fails to disclose, teach or suggest the first and second ohmic contact layers are respectively disposed on the first and second surfaces of the first conductive type submount and the Schottky contact layer directly connects with the first conductive type submount. On the other hand, Fig. 5 of Sheu shows a structure including a diode

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device of Fig. 3B bonded to a substrate 324 having metals 321, 322 thereon. Therefore, the diode device shown in Fig. 5 is substantially the same to the Fig 3B. The diode devices of Fig. 2B and Fig. 3B are much different as discussed above. There is not suggestion or motivation, in the reference or in the knowledge generally available to one of ordinary skilled in the art, to combine the two devices in a manner resulting in the claimed invention.

Moreover, Ikeda also fails to teach the first and second ohmic contact layers are respectively disposed on the first and second surfaces of the first conductive type submount and the Schottky contact layer directly connects with the first conductive type submount. Ikeda cannot cure the deficiencies of Fig. 2B of Sheu or/and Fig. 5 (Fig. 3B) of Sheu. Therefore, independent claim 15 is patentable over Sheu and Ikeda. For at the least the same reasons, its dependent claims 16-22 and 24-26 are also be patentable.

*Applicants respectfully traverse the rejection of claims 27-28 under 103(a) as being unpatentable over Sheu and Ikeda in view of Yonezawa because a prima facie case of obviousness has not been established by the Office Action.*

Applicants submit that, as disclosed above, Sheu and Ikeda fail to teach or suggest each and every element of claim 15 from which claims 27-28 depend. Yonezawa cannot cure the deficiencies of Sheu and Ikeda. Therefore, independent claim 15 is patentable over Sheu, and Ikeda and Yonezawa. For at the least the same reasons, its dependent claims 27-28 are also patentable as a matter of law.



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### CONCLUSION

For at least the foregoing reasons, it is believed that the pending claims are in proper condition for allowance. If the Examiner believes that a telephone conference would expedite the examination of the above-identified patent application, the Examiner is invited to call the undersigned.

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Respectfully submitted,

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